

LISTING OF CLAIMS

1. **(Currently Amended)** A composite sandwich structure with embedded electronics comprising:

first and second multilayer composite facesheet laminates made of structural fiber reinforced material;

first and second multilayer circuit laminates made of low dielectric fiber reinforced material with electrically conducting printed circuits embedded between low dielectric plies;

a core structure; **and**

electronic components located in a central region where said core structure is located and having electrical conducting pins in contact with and secured to said printed circuits within either of said multilayer circuit laminates ~~[[+]]~~—[[.]]

2. (Original) The composite sandwich structure of claim 1, wherein said structural fiber reinforced material includes at least one of a carbon, ceramic, glass, or high-density polyethylene.

3. (Original) The composite sandwich structure of claim 1, wherein said structural fiber reinforced material is a matrix material including thermoset polymer or thermoplastic polymer.

4. (Original) The composite sandwich structure of claim 1, wherein said circuit laminates include reinforcement fibers that are woven or non-woven low dielectric material.

5. (Original) The composite sandwich structure of claim 1, wherein said circuit laminates include fiber reinforced matrix material with a low dielectric thermoset polymer, thermoplastic polymer, ceramic, or ceramic particulate filled polymer.

6. **(Currently Amended)** The composite sandwich structure of claim 1, wherein said first and second multilayer circuit laminates are located on opposite sides of said core structure, and said multilayer circuit laminates ~~in~~ **and** said core structure are sandwiched between said first and second multilayer composite facesheet laminates.

7. (Original) The composite sandwich structure of claim 6, wherein said first multilayer composite facesheet laminate is bonded to said first multilayer circuit laminate, and said second multilayer composite facesheet laminate is bonded to said second multilayer circuit laminate.

8. (Original) The composite sandwich structure of claim 7, wherein said multilayer composite facesheet laminates are bonded to said multilayer circuit laminates with a resin that is subsequently cured.

9. (Original) The composite sandwich structure of claim 7, wherein said multilayer composite facesheet laminates are bonded to said multilayer circuit laminates using an adhesive after said laminates have been cured.

10. (Currently Amended) The composite sandwich structure of claim 1, wherein said electronic components include redundant circuitry and components, which ~~can be~~ are activated if equivalent components or circuitry have malfunctioned or failed.

11. (Original) The composite sandwich structure of claim 10, further including a signal control device to sense if the equivalent components of circuitry have malfunctioned or failed and a switch to electronically reconfigure the circuitry to isolate the equivalent components or circuitry that have malfunctioned or failed and activate said redundant circuitry and components.

12. (Original) The composite sandwich structure of claim 1, further including at least one heat sink lead thermally connected to a heat generating electronic component within the composite sandwich structure and thermally connected to a heat sink outside the composite sandwich structure.

13. (Original) The composite sandwich structure of claim 12, wherein said heat sink lead extends through said core structure and out of the composite sandwich structure therefrom.

14. (Original) The composite sandwich structure of claim 12, wherein said heat sink lead extends through one of said first or second multilayer circuit laminates and one of said first or second multilayer facesheet laminates.

15. (Withdrawn) A composite sandwich structure with embedded electronics comprising:

first and second outer structural layers;

first and second circuit layers sandwiched between said first and second structural layers;

a core structure sandwiched between said first and second circuit layers; and
electrical components located in a central core region defined by said core structure
and electrically connected to at least one of said circuit layers.

16. (Withdrawn) The composite sandwich structure of claim 15, when said core structure includes truss elements.

17. (Withdrawn) The composite sandwich structure of claim 16, including a third circuit layer attached to said truss elements.

18. (Withdrawn) The composite sandwich structure of claim 17, wherein at least some of said electronic components are mounted on and electrically connected to said third circuit layer.

19. (Withdrawn) The composite sandwich structure of claim 15, further including flexible circuitry members electrically connected to and extending between said first and second circuit layers.

20. (Withdrawn) The composite sandwich structure of claim 15, wherein said core structure includes a plurality of layered core members of differing materials, at least one of said materials being porous to allow air flow for cooling said electronic components.

21. (New) The composite sandwich structure as set forth in claim 1, further including a larger structural composite structure, and said composite sandwich structure is mounted to said structural composite structure, and said face sheet laminates provide stiffness, strength, and support to said structural composite structure.

22. (New) The composite sandwich structure as set forth in claim 1, wherein said core structure is porous and said electronic components are embedded in said porous core structure.

23. (New) A vehicle comprising:

a composite structure; and

a composite sandwich structure with embedded electronics including first and second multilayer composite face sheet laminates made of structural fiber reinforced material and mounted to said composite structure, said face sheet laminates providing structural stiffness, strength and support to said composite structure, first and second multilayer circuit laminates made of low dielectric fiber reinforced material with electrically conducting printed circuits embedded between low dielectric plies, a porous core structure located in a central region of said composite sandwich structure, electronic components mounted in said core structure, and electrical conducting pins in contact with and secured to said printed circuits within at least one of said multilayer circuit laminates.

24. (New) The vehicle as set forth in claim 23, wherein said vehicle is an aircraft.

25. (New) The vehicle as set forth in claim 24, wherein said composite structure is a bulkhead in the aircraft.

26. (New) The vehicle as set forth in claim 23, wherein said vehicle is an automobile.

27. (New) The vehicle as set forth in claim 23, wherein said first and second multilayer circuit laminates are located on opposite sides of said core structure, and said multilayer circuit laminates and said core structure are sandwiched between said first and second multilayer composite face sheet laminates.

28. (New) The vehicle as set forth in claim 27, wherein both said first and second multilayer composite face sheet laminates include multiple layers of a like material bonded together.

29. (New) The vehicle as set forth in claim 23, wherein said core structure includes truss elements.

30. (New) A method for providing structural stiffness and strength to a vehicle comprising the steps of:

providing a bulkhead in the vehicle;

providing a composite sandwich structure having first and second multilayer composite face sheet laminates of a structural fiber reinforcement material, first and second multilayer circuit laminates made of low dielectric material with electrically conducting printed circuits embedded between dielectric plies, a central core structure, electronic components located in the central region, wherein said core structure is located, and conducting pins in contact with and secured to said printed circuits within either of said multilayer circuit laminates; and

incorporating said composite sandwich structure in said bulkhead in a manner that said composite sandwich structure carries at least part of the structural load in said bulkhead by providing stiffness, strength, and support thereto.